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INTERNATIONAL PRELIMINARY EXAMINATION REPORT


(PCT Article 36 and Rule 70)

Applicant's or agent's file reference 01013.0162.00PC00	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/IB 03/03816	International filing date (day/month/year) 16.07.2003	Priority date (day/month/year) 17.07.2002
International Patent Classification (IPC) or both national classification and IPC B60B17/00		
Applicant BOMBARDIER TRANSPORTATION GMBH et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
- ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).
- These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(II) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application.

Date of submission of the demand 17.02.2004	Date of completion of this report 22.10.2004
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer Bolte, U Telephone No. +49 89 2399-7431



**INTERNATIONAL PRELIMINARY
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International application No. **PCT/IB 03/03816**

I. Basis of the report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

Description, Pages

1-14 as originally filed

Claims, Numbers

1-24 received on 26.04.2004 with letter of 26.04.2004

Drawings, Sheets

1/9-9/9 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
☐ the language of publication of the international application (under Rule 48.3(b)).
☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
☐ filed together with the international application in computer readable form.
☐ furnished subsequently to this Authority in written form.
☐ furnished subsequently to this Authority in computer readable form.
☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
☐ the claims, Nos.:
☐ the drawings, sheets:

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5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-24
	No: Claims	
Inventive step (IS)	Yes: Claims	1-24
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-24
	No: Claims	

2. Citations and explanations

see separate sheet

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Re Item V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

State of the art:

Document (D1) US 1 765 477 cited in the search report forms the relevant state of the art. It discloses a wheel set for a rail vehicle comprising a pair of wheels connected by an axle and a vibration absorbing device comprising a mass resiliently mounted for oscillatory movement with respect to the wheel.

Distinguishing features:

Claim 1 of the actual application is distinguished from the state of the art in that the vibration absorbing device acts in circumferential direction of the wheels.

Objective task:

Attenuation of torsional vibrations in the wheelset.

Grounds for the statement:

The subject-matter of the independent claim 1 is considered as new (Art. 33(2) PCT) (see above) and implies an inventive step (Art. 33(3) PCT), as none of the opposing documents gives a hint to use circumferentially acting vibration absorbing device in a train wheel set to accomplish the above task. Claims 2 to 21 depending on claim 1 are showing further embodiments of the invention. Claim 22 dealing with a rail vehicle comprising the arrangement of claim 1 accordingly fulfills the provisions of Art. 33(1) PCT as well. Method claims 23 and 24 are considered to be new and inventive as well as they rely on the Wheel set of claim 1.

The newly introduced features of the amended claims are based on the description as originally filed.

Industrial applicability:

The subject-matter of the present application is considered as industrially applicable (Art. 33(4) PCT) as it is used in the rail vehicle industry.

Certain defects in the international application

1. Independent claims 1 and 13 are not in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art (document D1) being placed in the

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preamble (Rule 6.3(b)(i) PCT) and with the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

2. The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).



5 Claims

1. A wheel set for a rail vehicle comprising a pair of wheels connected by an axle and a vibration absorbing device comprising a mass resiliently mounted for oscillatory movement with respect to the wheel set at the resonant frequency of torsional vibrations of the wheel/axle system, wherein damping of the oscillatory movement is provided by a friction determining surface between mutually contacting surfaces of the wheel set and the mass.
10
2. The wheel set according to any of the preceding claims, wherein the vibration absorbing device is mounted on the wheel.
15
3. The wheel set according to any of the preceding claims, wherein the mass of the vibration absorbing device comprises at least a segment of an annular ring concentrically mounted with respect to the axle.
20
4. The wheel set according to claim 3, wherein the ring segment is mounted to the wheel by a spring element.
5. The wheel set according to claim 4, wherein the wheel is provided with a bore and the spring element comprises a centering sleeve for insertion in the bore and a spring plate for engaging with the ring segment.
25
6. The wheel set according to claim 4, wherein the wheel is provided with a bore and the ring segment is provided with a counter bore and the spring element comprises a spring sleeve which inserts into both the bore and the counter bore.
30
7. The wheel set according to claim 5, wherein the spring sleeve includes a longitudinal slot, the width of which determines the maximum amplitude of oscillation of the ring segment with respect to the wheel.

- 5 8. The wheel set according to any of claims 3 to 7, wherein the wheel comprises a flange and a pair of ring segments are mounted on opposite facing sides of the wheel and connected together through the flange to oscillate together.
- 10 9. The wheel set according to claim 8, wherein the wheel is provided with a bore through the flange and the spring sleeve passes through the bore and inserts into counter bores formed in both ring segments.
- 15 10. The wheel set according to claim 9, wherein the ring segments are connected together by a fastening element passing through the spring sleeve.
- 20 11. The wheel set according to claim 10, wherein the fastening element comprises a compression sleeve and a tensioning bolt, the compression sleeve being of a length to support between the ring segments through the flange whereby on tensioning, the pre-stress of the bolt may be taken by the compression sleeve to reduce the contact force between the ring segments and the flange.
- 25 12. The wheel set according to any of claims 3 to 11, in which the ring segment consists of a brake disk.
- 30 13. The wheel set according to claim any of claims 5 to 11, in which the ring segment consists of a brake disk and at least one of either the bore or the counter bore is elliptical or oval and radially oriented to allow for thermal expansion of the brake disk.
14. The wheel set according to any of claims 3 to 11, wherein the mass is mounted to the wheel adjacent to its circumference.
15. The wheel set according to any of claims 1 or 2, wherein the vibration absorbing device comprises part of the wheel.

- 5 16. The wheel set according to claim 15, wherein the mass of the vibration absorbing device is provided by the rim of the wheel which is resiliently mounted with respect to the remainder of the wheel.
- 10 17. The wheel set according to claim 1, wherein the vibration absorbing device is mounted on the axle adjacent to the wheel.
18. The wheel set according to any preceding claim, wherein a vibration absorbing device is mounted on or adjacent to both wheels.
- 15 19. The wheel set according to any of the preceding claims further comprising a drive engaged to cause rotation of the axle.
- 20 20. The wheel set according to claim 19 wherein the drive engages the axle at or adjacent to the mid point thereof.
21. The wheel set according to claim 19 or 20 further comprising a control system, the control system being adapted in use to register and control slip between the wheels and the rail.
- 25 22. A rail vehicle comprising at least one wheel set according to any of claims 1 to 21.
- 30 23. A method of preventing or reducing torsional vibrations in a wheel set of a rail vehicle comprising a pair of wheels connected by an axle, the method comprising determining the resonant frequency of torsional vibrations of the wheel/axle system and resiliently mounting a vibration absorbing device in the form of a mass, on the wheel set, the mass and its resilient mounting being selected to oscillate at or near that resonant frequency.
- 35 24. The method of claim 23 wherein the vibration absorbing device is arranged according to any of claims 1 to 21.